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Session 101: Non-Surgical Strategies for Sacroiliac Joint Dysfunction
Jason Handschumacher, DPT, OCS

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Objectives

- Review relevant anatomical structures and stability concepts
- Examine the current literature regarding sacroiliac clinical examination findings, joint mobilization, non-surgical stabilization options and exercise
- Discuss the efficient and reliable clinical examination and interpretation of findings to guide treatment
- Demonstration of effective manual therapy and therapeutic exercise interventions

Key Points

- Does the SIJ move or is this an L5 problem?
- 1920s – 1940s - advent of imaging / discs
- Is the pain from the SIJ, the lumbar spine, the hip, all three or elsewhere?
- Does it fuse in some people, when?
- If it moves – how much is enough, too much, when in functional tasks?
- How can I tell if it moves too much or not enough?
- How can we optimize the motion?
- Where does all this fit with Pain Neuroscience and the individual?
- What do I do or not do with the person sitting in front of me?

Clinical Reasoning

Anatomy

- Gynecoid Pelvis: Wider and broader, less prominent ischial spines
- Android Pelvis: Longer sacrum, more narrow sub-pubic arch
Nutation

- Anterior/Inferior/Oblique motion of Sacral BASE
- Hip Extension / Anterior Rotation / Nutation / Spine Extension

Counternutation

- Posterior/Superior/Oblique motions of Sacral BASE
- Hip flexion / Posterior Rotation / Counter Nutation / Spine Flexion
### Anatomy

#### Stability Concepts

**“Arch Model”**
- “Form Closure”
  - Wedge Structure
  - Spine and LE columns
  - Sacrum as keystone – minimal motion/stable
- “Force Closure”
  - Compression
  - Muscles / Fascia
  - Ligaments
  - Weakness / Inhibition cause instability

**“Tensegrity Model”**
- Sacral Suspension by tensioned ligaments
  - Bicycle hub analogy
  - Frictionless force transfer
  - Agonist / Antagonist (“Ligamento-muscular reflex”) of
    - Muscles
    - Ligaments
  - Instability (ligament injury) causes inhibition / weakness

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### Anatomy

#### Nutation Muscles (Inhibited in injured state)
- Transversus Abdominus
- Gluteus Maximus (Superior portion)
- Multifidus
- Rectus Abdominus and Hamstrings
- Spinalis Thoracis
- External Oblique
- Superficial Erector Spinae

#### Counternutation Muscles (Overactivated in injured state)
- Piriformis
- Quadratus Lumborum
- Iliopsoas
- Latissimus Dorsi
- Gluteus Maximus (Inferior portion)
- Internal Obliques
- Anterior Hip flexors
- Hip Abductors
- Deep Erector Spinae
Anatomy

Questions / Goals of Treatment

▪ “Reverse Counternutation without reinjuring through too much Nutation” (Activate/Control/Strengthen Multifidus and T-A)

▪ Are they inhibited because they are contributing to the problem?

▪ “Core” – nutation inducing
  ▪ Do too much and you can provoke a problem
  ▪ Motion control, not just strength

▪ “Just do Pilates and you’ll be fine”

Anatomy

Questions / Goals of Treatment

▪ Inhibit / Stretch overactive Counternutation Muscles

▪ Ligamentous – muscular reflex elsewhere in the body
  ▪ Injury causing mm splinting

▪ Massage / Dry Needling / Manual techniques / Biofeedback

▪ “Just do Yoga and you will be OK”

Anatomy

▪ “Spinal Engine” / Myofascial Slings (Gracovetsky, Vleeming, Lee, Myers)
  ▪ Muscle, fascia, ligaments together
  ▪ Force extends beyond origins/insertion
  ▪ Superficial muscle and Deep muscle synergy
**Anatomy**

- **Anterior Oblique Sling**
  - EO / IO and opposite Hip Adductor

- **Posterior Oblique Sling**
  - Lat Dorsi and Opposite Glute Max

**Anatomy**

- **Deep Longitudinal Sling**
  - Erector Spinae, Multifidus, Biceps Femoris, Fascia, Sacrotuberous Ligament, Peroneus Longus, Ant Tibialis

- **Lateral Sling**
  - Glute Med, Glute Min, TFL, ITB, Contralateral Hip Adductors and QL

**Anatomy**

- **Tensegrity Alternative**
  - (Pardehshenas, 2014)

  - Trunk muscle EMG in various loads

  - Single limb and double limb stance

  - Coactivation of Internal Obliques in all conditions

  - Antagonistic contraction against load Lattisimus Dorsi and Erector Spinae
Stability Concepts

▪ Lower Crossed Syndrome
  ▪ (Janda, 1979)
  ▪ Erector Spinae and Hip Flexors (tight)
  ▪ Gluteals and Abdominals (weak)
  ▪ Sagittal plane

▪ Middle Crossed Syndrome - new
  ▪ Weaker Sling from dominant leg to non-dominant arm
  ▪ (Wallden, 2014)
  ▪ Transverse plane
  ▪ Screening of the slings

Examination

▪ History
  ▪ Typical pain complaints
    ▪ Buttock, thigh, anterior pelvic crest/groin
    ▪ Typically not below knee
    ▪ “Finger Test”
    ▪ “Catches”
  ▪ Lumbar, Sacroiliac, Hip
    ▪ Can mirror each other / both be involved
    ▪ Use clusters
Examination
“Making Your List”

- Seated
- Standing
- Supine
- Sidelying
- Prone

Examination

- Seated
  - Motion
    - Seated Flexion Test
  - Neuro Screen
    - Seated SLR / Slump
    - Myotomes
    - Reflexes

Examination

- Standing
  - Palpation
    - Position - Iliac Crest / LLD
    - Pain – muscles, ligaments, lumbar spine
  - Lumbar ROM / Lordosis angle
    - Inclinometer
  - Fortin Finger Test
  - Motion
    - Flexion / Extension Test
    - Repeated Motions – Centralization scan
  - Motion / Load Transfer
    - Gillet's / Modified Gillet's / Stork / March / Kinetic

Video
### Examination

<table>
<thead>
<tr>
<th>Supine</th>
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<tbody>
<tr>
<td>Active Straight Leg Raise (ASLR)</td>
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<tr>
<td>Note response to compression in different locations</td>
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<tr>
<td>Provocation (in order of Sensitivity)</td>
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<tr>
<td>Gapping / Distraction</td>
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<td>Thigh Thrust</td>
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<td>FABER – where hurts</td>
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<tr>
<td>Measure</td>
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<td>SLR</td>
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<tr>
<td>Measure - Inclinometer</td>
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<td>Familiar symptoms; &gt;70 degrees</td>
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<tr>
<td>Gaenslen’s (flexion overpressure)</td>
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### Examination

- Supine
- Hip pathology examination

- FABER
  - Anterior – hip issue

- Scour
  - IR ROM asymmetry
  - Hip OA

- FADIR – groin pain
  - Labral injury
  - Femoral Acetabular Impingement

### Examination

- Sidelying

  - Compression / Shear
    - SI joint

  - Hip rotator muscle activation / strength

  - Abdominal muscle activation / strength

  - Piriformis Syndrome
    - FAIR test (60 degrees Flexion, Adduction, Internal Rotation)
    - Reproduce Sciatic symptoms

[Video]
Examination

- Prone
- Sacral compression / thrust
- Repeated extension – Centralization

- Flexibility
  - Hip Flexors
  - Quadriceps

Video

Examination

- Cluster of findings
  - 3 / 5 and rule out discogenic centralization
  - Distraction, Thigh Thrust, Gaenslen’s test, Sacral Thrust, Compression
  - Sensitivity 0.91 Specificity 0.78 (0.87 if cannot centralize symptoms)
  - Positive Likelihood Ratio 4.16 Negative Likelihood Ratio 0.12 (Laslett, 2003)

- 2 / 4 (Distraction, Compression, Thigh Thrust, Sacral Thrust) (Laslett, 2005)

- Meta - analysis
  - Thigh Thrust or Compression alone – further diagnostics
  - 3/5 stressing tests – SIJ as cause likely
  - Discrepancy in medication used in SI blocks for comparison (Szadek, 2009)

Examination

- Prone, Motion, Provocation
- Soft tissues, Arthro, Mobilization, Manipulation, Exercise, Belt, Injections
- Position, Motion, Provocation
- Reassessment

Position, Motion, Provocation

Intervention

Soft tissues, Arthro, Mobilization, Manipulation, Exercise, Belt, Injections

Reassessment

Position, Motion, Provocation
Intervention

- Joint Mobilization
- Hip
  - Oscillation
  - Manipulation
  - Traction in various angles
- Sacroiliac
  - Oscillation
  - Manipulation
  - Alter activation of Transverse Abdominus (Bertossa, et al. 2014)
  - Improve Feed Forward contractions of Transverse Abdominus (Marshall, 2016)
- Muscle Energy Techniques (Supine or Sidelying)
  - Lumbar
    - Mobilization
    - Manipulation
  - Sacrum
    - Nutation – active spine extension
    - Nutation – coupled with breathing

Intervention

- Soft Tissues
- Muscles / Fascia / Ligaments
  - Inhibition
  - Massage
  - Contract / Relax activity
  - Modalities

Intervention

“I have to do something about my CORE “

“BASIC CORE ACTIVATION MOVES”

“From core activation to core stabilization”

“You cannot strengthen a muscle your brain is not using” – Diane Lee
Intervention

- Soft Tissues
  - Muscles (Trans Ab, Multifidus, Pelvic Floor)
  - Activation / Preparatory Contractions
    - Subtle
    - Timing / Delay
  - Feedback – Tactile, Imagery, EMG, Ultrasound Imaging
- Breathing
  - “Pilates technique” – increased activation of Trans Ab and Internal Oblique
  - (Barbosa, et al. 2015)
  - Controversies – just breathe!
- Neuromotor control

Intervention

- Soft Tissues
  - Muscles
    - Stabilization – Add a load / challenge
  - Strengthen
    - Non weightbearing
    - Weightbearing
    - Double Limb
    - Single Limb
  - Functional Activity

Intervention

- Soft Tissues
  - Muscles
  - Stabilization
  - A few favorites (Video)
    - Stabilizer in multiple positions
    - Supine leg lowering
    - Anterior Slings
    - Posterior Slings
    - Modified planks / variations
    - Heel squeeze - glutes
    - Richard “DonTigny” type exercises
      - “Rolling” (UE initiate / LE initiate)
      - Gray Cook
      - “Lifts and Chops”
      - Sit to stand
**Intervention**

- **Stability Belts**
  - "External Ligaments"
  - Do the job of the ligaments
    - Reactivate inhibited muscles
    - Relax the splinting muscles
  - Alter muscle activation (Jung, et al 2013)
    - In SLS – decreased biceps femoris amplitude
    - Decreased premotor reaction time for GM and BF
- **SI Loc - OPTP**
  - Active SI Belt
  - Don Joy
- **Com Pressor - Lee**

**Intervention**

- **Steroid Injections**
  - Provide relief to allow proper exercise
  - Confirm diagnosis
  - Fluoroscopically guided
- **Prolo Injections (Prolo – therapy)**
  - Increase ligamentous tension / thicken / “Re-grow”
    - Dextrose
    - Sodium Morrhuate
    - Combine with Xylocaine or other
  - When combined with manipulation and exercise may be beneficial
    - (Degnan, 2007 Cochrane Review)

**Intervention**

- **Radiofrequency Neural Ablation**
  - Dreyfuss, et al 2009
    - Can achieve denervation of the ligaments not the capsule
    - Ligament injury as pain generator (Recall the Tensegrity concepts)
    - Sacral lateral branches
  - Cohen et al, 2008
    - L4-L5 primary dorsal root rami and S1-S3 lateral branches
    - Average 8 months pain relief, reduced medication usage
**Intervention**

- Radiofrequency Neural Ablation
    - >50% pain reduction
    - 3-6 months average; some had >12 months relief
    - No difference between traditional and cooled radiofrequency techniques
  - Aydin, et al, 2010 (Meta-analysis)
    - Able to include 10 studies
    - Average 3-6 months of >50% pain reduction

**Position, Motion, Provocation**

**Examination**

**Intervention**

- Soft tissues, Joint Mobilization, Manipulation, Exercises, Belts, Injections

**Reassessment**

- Within and between sessions
  - Position
  - Motion
  - Symptoms
  - Muscle strength / timing
    - Active stabilization
    - Belt stabilization
  - Response to injection / neural ablation
Case Study

- 39 y.o. female
- Recurring Right SIJ / hip pain for about 15 years
- No specific trauma
- 2 children
  - Vaginal deliveries
  - Uncomplicated
- Worsening/frequent R hip/groin pain during second pregnancy 10 years ago
- No related surgery / other injury
- Pain in unilateral stance on the Right
- R groin muscle pain / spasm on “Bad days”
- Yoga classes of mixed benefit

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<td>Stump Testing / +</td>
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Case Study

Sidelying
- Muscle Strength / Activation
- Hip rotators and extensors
- Abdominal stability
- Compression / Shear + / -
- Piriformis Syndrome
  - PAIR + / -

Prone
- Prone palpation / posture
- PSIS position
- Ligaments Muscles
- Sacral compression / thrust + / -
- Repeated extension (Centralize) + / -
- Provocations / Relieving motions
  - Lumbar P-A
  - Hip P-A
  - Leg Traction
- Hip Scan
  - IR ROM L R

Case Study

• Video

Case Study

• Seated
  - Neurological Scan
  - Seated SLR - / +
  - Slump Testing - / +
  - Myotomes 5 / 5

Standing
- Standing palpation
- Posture / Position / Pain
- Finger Test
- AROM
  - Inclinometer
  - FB 55° BB 28° Lordosis 25°
  - Lumbar Quadrant Scan - / +
  - Standing motion testing
    - Forward Bend + / - Right
    - Gillet’s + / - Right
    - Repeated Motions (Centralize) Y N
  - Single Limb Stance
    - Fail / Pass Restricted R L
*Case Study*

**Supine**
- Supine palpation / posture
  - ASIS Level
  - Muscle tension: Malleoli Level
- Active Straight Leg Raise (ASLR)
  - Fail / Pass “Easier” with compression
- Gapping / Distraction
  - + / -
- Thigh Thrust
  - + / -
- FABER angle
  - R 75°, L 75°
- SLR
  - R 73°, thigh tension
  - L 79°, thigh tension
- Gaenslen’s
  - R + / -
  - L + / -
- Hip Scan
  - Scour: FADIR
- FABER
  - R 75°
  - L 75°

**Sidelying**
- Muscle Strength / Activation
  - Hip rotators and extensors: Normal
  - Abdominal stability: Fair/Good
- Compression / Shear
  - + / -
- Piriformis Syndrome
  - FAIR: + / -

**Prone**
- Prone palpation / posture
  - PSIS position: Level
  - Ligaments: R Posterior SI, Muscles: Non tender
- Sacral compression / thrust
  - + / -
- Repeated extension (Centralize)
  - + / -
- Provocations / Relieving motions
  - Lumbar P-A, Hip P-A glide
  - Leg Traction: Relieving
- Hip Scan
  - IR ROM
  - L 52°, R 54°

**Case Study**
- Summarize
  - Ligamentous pain on the R
  - Small motion restriction on the R
  - Dynamic
    - Normal static position / alignment are equal
  - Provocations
    - Gapping, Thigh Thrust, Gaenslen’s
    - ASLR
      - “Easier” with compression
    - Hip scan / Lumbar Scan
      - No significant issues / symptom reproduction
- Mobility problem or a stability problem?
Case Study

Interventions selected
- Stabilization
  - Trans – Ab and Multifidus activation
  - Active stabilization
- "DonTigny exercise"
  - Active leg lowering
  - Sidelying leg circles
- Plank on knees with heel squeeze
- Considering stabilization ball
- Manipulation
  - SIJ
  - Hip
  - Infrequently
  - Muscle Energy Techniques
- Yoga
  - Avoid single leg

Reassess motion / symptoms

Questions

Comments

Thank You

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